$$S = \sum_{x}^{12} W_x \quad \text{(Eq. I-5)}$$

Where:

S = 100 percent of annual manufacturing capacity of a facility (m^2).

W_x = Maximum designed substrate starts of a facility in month x (m^2 per month).

x = Month.

§ 98.92 GHGs to report.

(a) You must report emissions of fluorinated GHGs (as defined in § 98.6) and N_2O. The fluorinated GHGs that are emitted from electronics manufacturing production processes include, but are not limited to, those listed in Table I–2 to this subpart. You must individually report, as appropriate:

(1) Fluorinated GHGs emitted from plasma etching.

(2) Fluorinated GHGs emitted from chamber cleaning.

(3) Fluorinated GHGs emitted from wafer cleaning.

(4) N_2O emitted from chemical vapor deposition and other electronics manufacturing processes.

(5) Fluorinated GHGs emitted from heat transfer fluid use.

(6) All fluorinated GHGs and N_2O consumed, including gases used in manufacturing processes other than those listed in paragraphs (a)(1) through (a)(5) of this section.

(b) CO_2, CH_4, and N_2O combustion emissions from each stationary combustion unit. You must calculate and report these emissions under subpart C of this part (General Stationary Fuel Combustion Sources) by following the requirements of subpart C of this part.

§ 98.93 Calculating GHG emissions.

(a) You must calculate total annual facility-level emissions of each fluorinated GHG used in electronics manufacturing production processes at your facility, for each process type, using Equations I–6 and I–7 of this subpart according to the procedures in paragraphs (a)(1), (a)(2), (a)(3), (a)(4), (a)(5), or (a)(6) of this section, as appropriate. Facilities to which the procedures in paragraphs (a)(1) of this section or (a)(2) of this section apply may elect to use the procedures in paragraph (a)(3) as an alternative. If your facility uses less than 50 kg of a fluorinated GHG in one reporting year, you may calculate emissions as equal to your facility's annual consumption for that specific gas as calculated in Equation I–11 of this subpart. Where your facility is required to perform calculations using default emission factors for gas utilization and by-product formation rates according to the procedures in paragraphs (a)(1) or (a)(2) of this section, and default values are not available for a particular input gas and process type or sub-type combination in Tables I–3, I–4, I–5, I–6, or I–7, you must follow the procedures in paragraph (a)(6) of this section.

$$\mathrm{Pr}\,ocesstypeE_i = \sum_{j=1}^{N} E_{ij} \quad \text{(Eq. I-6)}$$

Where:

$ProcesstypeE_i$ = Annual emissions of input gas i from the processes type (metric tons).

E_{ij} = Annual emissions of input gas i from recipe, process sub-type, or process type j as calculated in Equation I–8 of this subpart (metric tons).

N = The total number of recipes or process sub-types j that depends on the electronics manufacturing facility and emission calculation methodology. If E_{ij} is calculated for a process type j in Equation I–8 of this subpart, N = 1.

i = Input gas.

j = Recipe, process sub-type, or process type.

$$\mathrm{Pr}\,ocesstypeBE_k = \sum_{j=1}^{N}\sum_{i} BE_{ijk} \quad \text{(Eq. I-7)}$$

Where:

$ProcesstypeBE_k$ = Annual emissions of by-product gas k from the processes type (metric tons).

BE_{ijk} = Annual emissions of by-product gas k formed from input gas i used for recipe, process sub-type, or process type j as calculated in Equation I–9 of this subpart (metric tons).

N = The total number of recipes or process sub-types j that depends on the electronics manufacturing facility and emission calculation methodology. If BE_{kij} is calculated for a process type j in Equation I–9 of this subpart, N = 1.

i = Input gas.

j = Recipe, process sub-type, or process type.

k = By-product gas.

(1) If you manufacture MEMS, LCDs, or PVs, you must, except as provided in §98.93(a)(3), calculate annual facility-level emissions of each fluorinated GHG used for the plasma etching and chamber cleaning process types using default utilization and by-product formation rates as shown in Table I–5, I–6, or I–7 of this subpart, as appropriate, and by using Equations I–8 and I–9 of this subpart.

(2) If you manufacture semiconductors on wafers measuring 300 mm or less in diameter, except as provided in §98.93(a)(3), you must adhere to the procedures in paragraphs (a)(2)(i) or (a)(2)(ii) of this section.

(i) If your facility has an annual manufacturing capacity, as calculated using Equation I–5 of this subpart, of less than or equal to 10,500 m^2 of substrate, you must adhere to the procedures in paragraphs (a)(i)(A) through (a)(i)(C) of this section.

(A) You must calculate annual facility-level emissions of each fluorinated GHG used for the plasma etching process type using default utilization and by-product formation rates as shown in Table I–3 or I–4 of this subpart, and by using Equations I–8 and I–9 of this subpart.

(B) You must calculate annual facility-level emissions of each fluorinated GHG used for each of the process subtypes associated with the chamber cleaning process type, including in-situ plasma chamber clean, remote plasma chamber clean, and in-situ thermal chamber clean, using default utilization and by-product formation rates as shown in Table I–3 or I–4 of this subpart, and by using Equations I–8 and I–9 of this subpart.

(C) You must calculate annual facility-level emissions of each fluorinated GHG used for the wafer cleaning process type using default utilization and by-product formation rates as shown in Table I–3 or I–4 of this subpart and by using Equations I–8 and I–9 of this subpart.

(ii) If your facility has an annual manufacturing capacity of greater than 10,500 m^2 of substrate, as calculated using Equation I–5 of this subpart, you must adhere to the procedures in paragraphs (a)(ii)(A) through (a)(ii)(C) of this section.

(A) You must calculate annual facility-level emissions of each fluorinated GHG used for the plasma etching process type using recipe-specific utilization and by-product formation rates determined as specified in §98.94(d), and by using Equations I–8 and I–9 of this subpart. You must develop recipe-specific utilization and by-product formation rates for each individual recipe or set of similar recipes as defined in §98.98. Recipe-specific utilization and by-product formation rates must be developed each reporting year only for recipes which are not similar to any recipe used in a previous reporting year, as defined in §98.98.

(B) You must calculate annual facility-level emissions of each fluorinated GHG used for each of the process subtypes associated with the chamber cleaning process type, including in-situ plasma chamber clean, remote plasma chamber clean, and in-situ thermal chamber clean, using default utilization and by-product formation rates as shown in Table I–3 or I–4 to this subpart, and by using Equations I–8 and I–9 of this subpart.

(C) You must calculate annual facility-level emissions of each fluorinated

GHG used for the wafer cleaning process type using default utilization and by-product formation rates as shown in Table I–3 or I–4 to this subpart, and by using Equations I–8 and I–9 of this subpart.

(3) If you do not adhere to procedures as specified in paragraphs (a)(1) and (a)(2) of this section, you must calculate annual facility-level emissions of each fluorinated GHG for all fluorinated GHG-emitting production processes using recipe-specific utilization and by-product formation rates determined as specified in § 98.94(d) and by using Equations I–8 and I–9 of this subpart. You must develop recipe-specific utilization and by-product formation rates for each individual recipe or set of similar recipes as defined in § 98.98. Recipe-specific utilization and by-product formation rates must be developed each reporting year only for recipes which are not similar to any recipe used in a previous reporting year, as defined in § 98.98.

(4) If you manufacture semiconductors on wafers measuring greater than 300 mm in diameter, you must calculate annual facility-level emissions of each fluorinated GHG used for all fluorinated GHG emitting production processes using recipe-specific utilization and by-product formation rates as specified in § 98.94(d), and by using Equations I–8 and I–9 of this subpart. You must develop recipe-specific utilization and by-product formation rates for each individual recipe or set of similar recipes as defined in § 98.98. Recipe-specific utilization and by-product formation rates must be developed each reporting year only for recipes that are not similar to any recipe used in a previous reporting year, as defined in § 98.98.

(5) To be included in a set of similar recipes for the purposes of this subpart, a recipe must be similar to the recipe in the set for which recipe-specific utilization and by-product formation rates have been measured.

(6) Where your facility is required to perform calculations using default emission factors for gas utilization and by-product formation rates according to the procedures in paragraphs (a)(1) or (a)(2) of this section, and default values are not available for a particular input gas and process type or sub-type combination in Tables I–3, I–4, I–5, I–6, or I–7, you must follow the procedures in either paragraph (a)(6)(i) or (a)(6)(ii) of this section and use Equations I–8 and I–9 of this subpart.

(i) You must use utilization and by-product formation rates of 0.

(ii) You must develop recipe-specific utilization and by-product formation rates determined as specified in § 98.94(d) for each individual recipe or set of similar recipes as defined in § 98.98. Recipe-specific utilization and by-product formation rates must be developed each reporting year only for recipes that are not similar to any recipe used in a previous reporting year, as defined in § 98.98.

$$E_{ij} = C_{ij} * (1 - U_{ij}) * (1 - a_{ij} * d_{ij}) * 0.001 \quad \text{(Eq. I-8)}$$

Where:

E_{ij} = Annual emissions of input gas i from recipe, process sub-type, or process type j (metric tons).

C_{ij} = Amount of input gas i consumed for recipe, process sub-type, or process type j, as calculated in Equation I–13 of this subpart (kg).

U_{ij} = Process utilization rate for input gas i for recipe, process sub-type, or process type j (expressed as a decimal fraction).

a_{ij} = Fraction of input gas i used in recipe, process sub-type, or process type j with abatement systems (expressed as a decimal fraction).

d_{ij} = Fraction of input gas i destroyed or removed in abatement systems connected to process tools where recipe, process sub-type, or process type j is used, as calculated in Equation I–14 of this subpart (expressed as a decimal fraction).

0.001 = Conversion factor from kg to metric tons.

i = Input gas.

j = Recipe, process sub-type, or process type.

$$BE_{ijk} = B_{ijk} * C_{ij} * (1 - a_{ij} * d_{jk}) * 0.001 \quad \text{(Eq. I-9)}$$

Where:

BE_{ijk} = Annual emissions of by-product gas k formed from input gas i from recipe, process sub-type, or process type j (metric tons).

B_{ijk} = By-product formation rate of gas k created as a by-product per amount of input gas i (kg) consumed by recipe, process sub-type, or process type j (kg).

C_{ij} = Amount of input gas i consumed for recipe, process sub-type, or process type j, as calculated in Equation I–13 of this subpart (kg)).

a_{ij} = Fraction of input gas i used for recipe, process sub-type, or process type j with abatement systems (expressed as a decimal fraction).

d_{jk} = Fraction of by-product gas k destroyed or removed in abatement systems connected to process tools where recipe, process sub-type, or process type j is used, as calculated in Equation I–14 of this subpart (expressed as a decimal fraction).

0.001 = Conversion factor from kg to metric tons.

i = Input gas.

j = Recipe, process sub-type, or process type.

k = By-product gas.

(b) You must calculate annual facility-level N_2O emissions from each chemical vapor deposition process and other electronics manufacturing production processes using Equation I–10 of this subpart and the methods in paragraphs (b)(1) and (b)(2) of this section. If your facility uses less than 50 kg of N_2O in one reporting year, you may calculate emissions as equal to your facility's annual consumption for N_2O as calculated in Equation I–11 of this subpart.

(1) You must use a factor for N_2O utilization for chemical vapor deposition processes pursuant to either paragraph (b)(1)(i) or (b)(1)(ii) of this section.

(i) You must develop a facility-specific N_2O utilization factor averaged over all N_2O-using chemical vapor deposition processes determined as specified in §98.94(e).

(ii) If you do not use a facility-specific N_2O utilization factor for chemical vapor deposition processes, you must use the default utilization factor as shown in Table I–8 to this subpart for N_2O from chemical vapor deposition processes.

(2) You must use a factor for N_2O utilization for other manufacturing processes pursuant to either paragraph (b)(2)(i) or (b)(2)(ii) of this section.

(i) You must develop a facility-specific N_2O utilization factor averaged over all N_2O-using electronics manufacturing production processes other than chemical vapor deposition processes determined as specified in §98.94(e).

(ii) If you do not use a facility-specific N_2O utilization factor for manufacturing production processes other than chemical vapor deposition, you must use the default utilization factor in as shown in Table I–8 to this subpart for N_2O from manufacturing production processes other than chemical vapor deposition.

$$E(N_2O)_j = C_{N_2O,j} * (1 - U_{N_2O,j}) * (1 - a_{N_2O,j} * d_{N_2O,j}) * 0.001 \quad \text{(Eq. I-10)}$$

Where:

$E(N_2O)_j$ = Annual emissions of N_2O for N_2O-using process j (metric tons).

$C_{N2O,j}$ = Amount of N_2O consumed for N_2O-using process j, as calculated in Equation I–13 of this subpart and apportioned to N_2O process j (kg).

$U_{N2O,j}$ = Process utilization factor for N_2O-using process j (expressed as a decimal fraction).

$a_{N2O,j}$ = Fraction of N_2O used in N_2O-using process j with abatement systems (expressed as a decimal fraction).

$d_{N2O,j}$ = Fraction of N_2O for N_2O-using process j destroyed or removed in abatement systems connected to process tools where process j is used, as calculated in Equation I–14 of this subpart (expressed as a decimal fraction).

0.001 = Conversion factor from kg to metric tons.

j = Type of N_2O-using process, either chemical vapor deposition or other N_2O-using manufacturing processes.

(c) You must calculate total annual input gas i consumption for each fluorinated GHG and N_2O using Equation I–11 of this subpart. Pursuant to §98.92(a)(6), for all fluorinated GHGs and N_2O used at your facility for which you do not calculate emissions using Equations I–6, I–7, I–8, I–9, and I–10 of this subpart, calculate consumption of these fluorinated GHGs and N_2O using Equation I–11 of this subpart.

$$C_i = (I_{Bi} - I_{Ei} + A_i - D_i) \quad \text{(Eq. I-11)}$$

Where:

C_i = Annual consumption of input gas i (kg per year).

I_{Bi} = Inventory of input gas i stored in containers at the beginning of the reporting year, including heels (kg). For containers in service at the beginning of a reporting year, account for the quantity in these containers as if they were full.

I_{Ei} = Inventory of input gas i stored in containers at the end of the reporting year, including heels (kg). For containers in service at the end of a reporting year, account for the quantity in these containers as if they were full.

A_i = Acquisitions of input gas i during the year through purchases or other transactions, including heels in containers returned to the electronics manufacturing facility (kg).

D_i = Disbursements of input gas i through sales or other transactions during the year, including heels in containers returned by the electronics manufacturing facility to the chemical supplier, as calculated using Equation I–12 of this subpart (kg).

i = Input gas.

(d) You must calculate disbursements of input gas i using facility-wide gas-specific heel factors, as determined in §98.94(b), and by using Equation I–12 of this subpart.

$$D_i = \sum_{l=1}^{M} \left(h_{il} * N_{il} * F_{il}\right) + X_i \quad \text{(Eq. I-12)}$$

Where:

D_i = Disbursements of input gas i through sales or other transactions during the reporting year, including heels in containers returned by the electronics manufacturing facility to the gas distributor (kg).

h_{il} = Facility-wide gas-specific heel factor for input gas i and container size and type l (expressed as a decimal fraction), as determined in §98.94(b). If your facility uses less than 50 kg of a fluorinated GHG or N_2O in one reporting year, you may assume that any h_{il} for that fluorinated GHG or N_2O is equal to zero.

N_{il} = Number of containers of size and type l returned to the gas distributor containing the standard heel of input gas i.

F_{il} = Full capacity of containers of size and type l containing input gas i (kg).

X_i = Disbursements under exceptional circumstances of input gas i through sales or other transactions during the year (kg). These include returns of containers whose contents have been weighed due to an exceptional circumstance as specified in §98.94(b)(4).

i = Input gas.

l = Size and type of gas container.

M = The total number of different sized container types. If only one size and container type is used for an input gas i, M=1.

(e) You must calculate the amount of input gas i consumed for each individual recipe (including those in a set of similar recipes) process sub-type, or process type j, using Equation I–13 of this subpart.

$$C_{ij} = f_{ij} * C_i \quad \text{(Eq. I-13)}$$

Where:

$C_{i,j}$ = The annual amount of input gas i consumed for recipe, process sub-type, or process type j (kg).

$f_{i,j}$ = Recipe-specific, process sub-type-specific, or process type-specific input gas i apportioning factor (expressed as a decimal fraction), as determined in accordance with §98.94(c).

C_i = Annual consumption of input gas i as calculated using Equation I–11 of this subpart (kg).

i = Input gas.

j = Recipe, process sub-type, or process type.

(f) If you report controlled emissions pursuant to §98.94(f), you must calculate the fraction of input gas i destroyed in abatement systems for each individual recipe (including those in a set of similar recipes) process sub-type, or process type j by using Equation I–14 of this subpart.

$$d_{i,j} = \frac{\sum_p C_{ijp} * d_{ijp} * u_p}{\sum_p C_{ijp}} \quad \text{(Eq. I-14)}$$

Where:

d_{ij} = Fraction of input gas i destroyed or removed in abatement systems connected to process tools where recipe, process sub-type, or process type j is used (expressed as a decimal fraction).

C_{ijp} = The amount of input gas i consumed for recipe, process sub-type, or process type j fed into abatement system p (kg).

d_{ijp} = Destruction or removal efficiency for input gas i in abatement system p connected to process tools where recipe, process sub-type, or process type j is used (expressed as a decimal fraction). This is zero unless the facility adheres to requirements in §98.94(f).

u_p = The uptime of abatement system p as calculated in Equation I–15 of this subpart (expressed as a decimal fraction).

i = Input gas.

j = Recipe, process sub-type, or process type.

p = Abatement system.

(g) If you report controlled emissions pursuant to §98.94(f), you must calculate the uptime by using Equation I–15 of this subpart.

$$u_p = \frac{t_p}{T_p} \quad \text{(Eq. I-15)}$$

Where:

u_p = The uptime of abatement system p (expressed as a decimal fraction).

t_p = The total time in which abatement system p is in an operational mode when fluorinated GHGs or N_2O are flowing through production process tool(s) connected to abatement system p (hours).

T_p = Total time in which fluorinated GHGs or N_2O are flowing through production process tool(s) connected to abatement system p (hours).

p = Abatement system.

(h) If you use fluorinated heat transfer fluids, you must report the annual emissions of fluorinated GHG heat transfer fluids using the mass balance approach described in Equation I–16 of this subpart.

$$EH_i = density_i * (I_{iB} + P_i - N_i + R_i - I_{iE} - D_i) * 0.001 \quad \text{(Eq. I-16)}$$

Where:

EH_i = Emissions of fluorinated GHG heat transfer fluid i, (metric tons/year).

$Density_i$ = Density of fluorinated heat transfer fluid i (kg/l).
I_{iB} = Inventory of fluorinated heat transfer fluid i in containers other than equipment at the beginning of the reporting year (in stock or storage) (l). The inventory at the beginning of the reporting year must be the same as the inventory at the end of the previous reporting year.
P_i = Acquisitions of fluorinated heat transfer fluid i during the reporting year (l), including amounts purchased from chemical suppliers, amounts purchased from equipment suppliers with or inside of equipment, and amounts returned to the facility after off-site recycling.
N_i = Total nameplate capacity (full and proper charge) of equipment that uses fluorinated heat transfer fluid i and that is newly installed during the reporting year (l).
R_i = Total nameplate capacity (full and proper charge) of equipment that uses fluorinated heat transfer fluid i and that is removed from service during the reporting year (l).
I_{iE} = Inventory of fluorinated heat transfer fluid i in containers other than equipment at the end of the reporting year (in stock or storage)(l).
D_i = Disbursements of fluorinated heat transfer fluid i during the reporting year, including amounts returned to chemical suppliers, sold with or inside of equipment, and sent off-site for verifiable recycling or destruction (l). Disbursements should include only amounts that are properly stored and transported so as to prevent emissions in transit.
0.001 = Conversion factor from kg to metric tons.
i = Heat transfer fluid.

§ 98.94 Monitoring and QA/QC requirements.

(a) For calendar year 2011 monitoring, you may follow the provisions in paragraphs (a)(1) through (a)(3) of this section for best available monitoring methods.

(1) *Best available monitoring methods.* From January 1, 2011 through September 30, 2011, owners or operators may use best available monitoring methods for any parameter that cannot reasonably be measured according to the monitoring and QA/QC requirements of this subpart. The owner or operator must use the calculation methodologies and equations in § 98.93, but may use the best available monitoring method for any parameter for which it is not reasonably feasible to acquire, install, or operate a required piece of monitoring equipment in a facility, or to procure necessary measurement services by January 1, 2011. Starting no later than October 1, 2011, the owner or operator must discontinue using best available monitoring methods and begin following all applicable monitoring and QA/QC requirements of this part, except as provided in paragraphs (a)(2), (a)(3), or (a)(4) of this section. Best available monitoring methods means any of the following methods specified in this paragraph:

(i) Monitoring methods currently used by the facility that do not meet the specifications of this subpart.

(ii) Supplier data.

(iii) Engineering calculations.

(iv) Other company records.

(2) *Requests for extension of the use of best available monitoring methods in 2011 for parameters other than recipe-specific utilization and by-product formation rates for the plasma etching process type.* With respect to any provision of this subpart except § 98.93(a)(2)(ii)(A), the owner or operator may submit a request to the Administrator under this paragraph (a)(2) to use one or more best available monitoring methods to estimate emissions that occur between July 1, 2011 and December 31, 2011.

(i) *Timing of request.* The extension request must be submitted to EPA no later than February 28, 2011.

(ii) *Content of request.* Requests must contain the following information:

(A) A list of specific items of monitoring instrumentation and measuring services for which the request is being made and the locations where each piece of monitoring instrumentation will be installed and where each measurement service will be provided.

(B) Identification of the specific rule requirements for which the instrumentation or measurement service is needed.

(C) A description of the reasons why the needed equipment could not be obtained, installed, or operated or why the needed measurement service could not be provided before July 1, 2011.

(D) If the reason for the extension is that the equipment cannot be purchased, delivered, or installed before